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1979 PESTICIDE USE ON VEGETABLES IN THE SOUTHEAST, A PRELIMINARY REPORT

by

Walter L. Ferguson
and
Iris E. McCalla

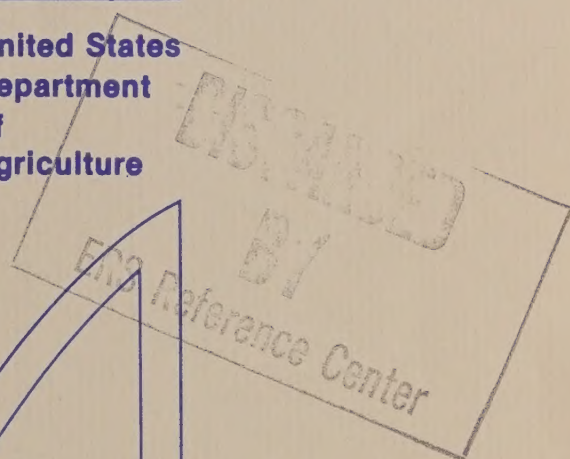
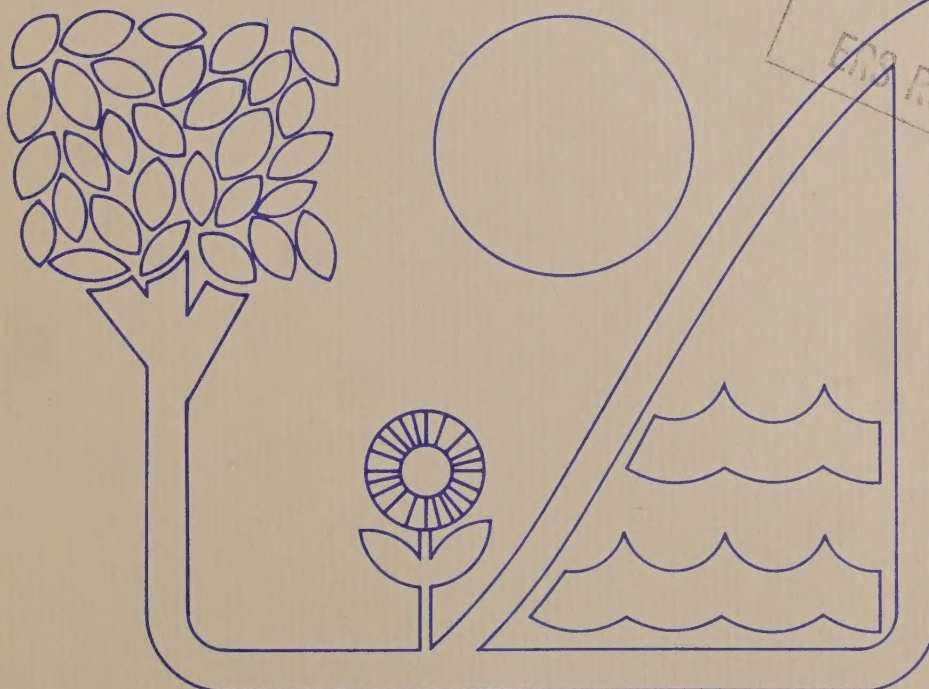
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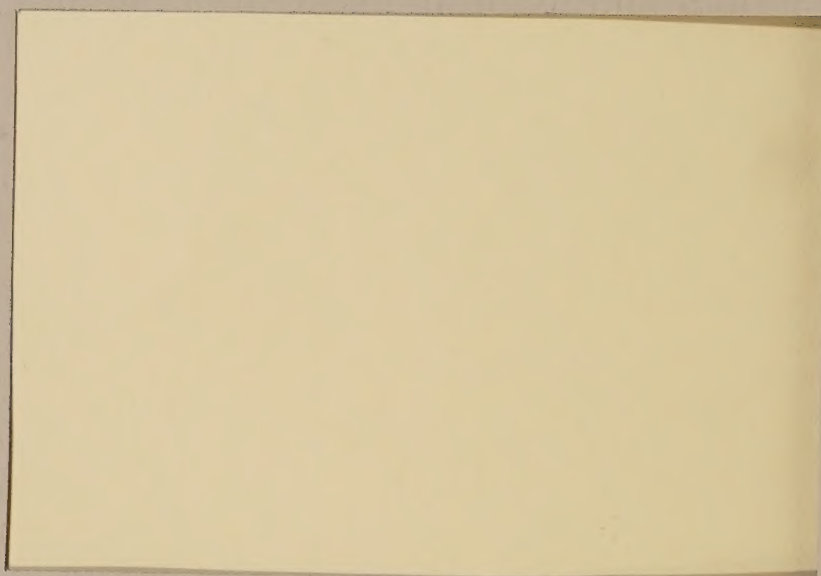
ERS Staff Report No. AGES811029

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Natural Resource Economics Division
Economic Research Service
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1979 PESTICIDE USE ON VEGETABLES IN THE SOUTHEAST, A PRELIMINARY REPORT

INTRODUCTION

In this report, patterns of pesticide use in the Southeast (North Carolina, South Carolina, and Georgia) in 1979 are discussed for cabbage, cantaloups, cucumbers, snap beans, sweet corn, tomatoes, and watermelons. Survey data were collected on quantities of pesticides used, acres treated, acre-treatments, number of applications, annual rates, and rate per acre-treatment. This report provides information useful to policymakers, researchers, extension specialists, and industry personnel. Because vegetables are highly susceptible to weeds, insects, diseases, and other pest damage, there is a continuing need for information on pesticides used in vegetable production. Regulations on the use of pesticides and review of registrations by the Environmental Protection Agency

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ABSTRACT

According to the 1979 Vegetable Pesticide Survey, nearly 1 million pounds of pesticides were used to control weeds, insects, diseases, and nematodes on seven vegetable crops in North Carolina, South Carolina, and Georgia. The seven vegetable crops include cabbage, cantaloups, cucumbers, snap beans, sweet corn, tomatoes, and watermelons. About 378,000 acre-treatments were made ranging from 133,000 for tomatoes to 13,000 for cantaloups.

Key Words: Pesticides, herbicides, fungicides, insecticides, nematocides, tank-mixes, acres treated, application rates, vegetables, Southeast.

* This paper was prepared for limited distribution to the research community *
* outside the U.S. Department of Agriculture. The data in this report are *
* preliminary, and consequently subject to change. The data have not been *
* subjected to statistical reliability testing, but will be tested prior to *
* finalization and publication. The final tabulation of the data will pro- *
* vide information for 6 regions which will include data for 18 States. *
* The final tabulations are scheduled for publication in early 1982. The *
* data are being released at this time to allow the agricultural community *
* an opportunity to comment on the data. If you have any comments, please *
* send them by December 31, 1981 to: *
*
* Herman W. Delvo *
* Economics of Pesticide Regulation *
* Room 408 *
* 500 12th Street, S.W. *
* Washington, D.C. 20250 *
*
* Use of company names or products in this report is for identification *
* only and does not imply endorsement by the U.S. Department of Agriculture. *
*

ACKNOWLEDGEMENTS

The 1979 Vegetable Pesticide Survey was conducted by a predecessor Agency of the Statistical Reporting Service. Larry K. Roberson and Paul W. Blackwood provided special assistance and advice in compiling the data. Herman W. Delvo and Craig D. Osteen of the Economic Research Service provided helpful comments and suggestions in their reviews of final drafts. The data were reviewed for accuracy by university crop specialists having expertise for those crops in the survey. The specialists included Charles E. Drye, Dan O. Ezel, J. Dan Gay, Randall P. Griffin, George G. Kennedy, James F. Miller, Thomas J. Monaco, Paul B. Shoemaker, Kenneth A. Sorensen, and A. Leon Stacy. Constance D. Byledbal, Victoria N. Valentine, Beverly A. Herath, and Andrea E. Lunsford typed the preliminary and final drafts of the manuscript.

create the need for accurate, detailed information for economic studies.

The quantity of pesticides used is affected by the number of acres planted. For six of the seven crops, the 1979 acreage approximates the 1978-80 average (Table 1). A minor difference of two percent is indicated for the seven crop total, 169,400 acres in 1979 versus 166,400 for the 3-year average. Thus, 1979 could be described as a typical year for acreage of vegetables planted. However, the number of planted acres is only one of several factors affecting pesticide usage. Weather conditions, pest infestations, and pest resistance affect pesticide rates and the number of applications per season.

Planted acreage of the seven crops surveyed in 1979 ranged from nearly 55,000 acres of cucumbers and watermelons to about 5,000 acres of sweet corn. Of nearly 170,000 acres planted in 1979, about 40,000 acres of cucumbers and 5,000 acres of snap beans were for the processing market.

As pests not only affect yield but also quality, the appearance of the product has a considerable impact on market price. Thus, for fresh and processing market crops, pest control is especially important.

METHODOLOGY

As part of the national survey of pesticide use on vegetables, Southeast vegetable growers were personally interviewed to collect data on specific pesticides used, acres treated, methods of application, and target pests controlled in 1979. Approximately 500 growers were interviewed in North Carolina, 500 in South Carolina, and 300 in Georgia.

A stratified random sample design was used to select growers. Data were expanded for individual farms in the survey to reflect all farms by multiplying the sample data by the inverse of the sample ratio for each stratum. The pesticide use data for each crop were then adjusted by the ratio of the number

Table 1. Acres planted in 1979 compared with 1978-80 average, seven vegetables, Southeast a/ b/

Crop	Fresh market			Processing market			Fresh and processing markets	
	:	:	:	:	:	:	:	:
	: 1978	: 1979	: 1980	: 1978	: 1979	: 1980	: 1979	: 3-year average
<hr/>								
				-----1000 acres-----				
Cabbage	12.3	12.2	11.4	-	-	-	12.2	12.0
Cantaloups	7.8	7.9	7.9	-	-	-	7.9	7.9
Cucumbers	13.9	14.5	12.9	38.2	40.2	34.8	54.7	51.5
Snap beans	16.8	17.1	19.7	2.9	5.2	4.4	22.3	22.0
Sweet corn	5.1	5.1	5.1	-	-	-	5.1	5.1
Tomatoes	13.3	12.9	12.2	-	-	-	12.9	12.8
Watermelons	57.4	54.3	53.6	-	-	-	54.3	55.1
Total	126.6	124.0	122.8	41.1	45.4	39.2	169.4	166.4

-- = none

a/ Includes North Carolina, South Carolina, and Georgia.

b/ "Vegetables, 1980 Annual Summary", U.S. Dept. Agr., Vg 1-2(80), December 1980.

of acres of the crop grown in the State to the number of expanded sample acres for the crop grown.

INTERPRETING THE DATA

Pesticides are grouped into the following categories: (1) herbicides (used to kill plants or inhibit their growth), (2) insecticides (used to kill or inhibit insects), (3) fungicides (used to control diseases by killing or inhibiting fungi), and (4) nematicides (used to kill or inhibit nematodes and other organisms in the soil). Multi-purpose soil fumigants are included in nematicides.

The term, "acres treated", is used to identify acres receiving one or more applications of a specific pesticide ingredient. Acres treated are not additive because two or more pesticides may have been used on the same acre. As these acres are not mutually exclusive, summing them could result in double counting. For this reason, the summation of acres treated is not shown in Tables 5 through 19.

"Acre-treatments" are the number of acres treated one time with a specific pesticide. The number of applications per season was derived by dividing the acre-treatments by the acres treated for each specific pesticide material.

Single application and annual rates are estimated for specific active ingredients. Annual rates include the average rate for all seasons (spring, summer, and fall). The single application rate is derived by dividing the total active ingredients of a specific pesticide by the number of acre-treatments; the annual rate is derived by dividing the total active ingredients by the number of acres treated.

Acres treated and acre-treatments for Bacillus thuringiensis, a bacterium, are included in the insecticide category. The rates and quantities applied

are not reported since application rates are expressed in terms of spores per gram rather than in pounds of active ingredient.

The rate per application and number of applications for specific pesticides may vary considerably from published guidelines for a number of reasons. For example, published rates are generally broadcast rates whereas a number of the rates reported in the survey were band or in-furrow rates which are one-fourth to one-third that of the broadcast rates. Also, young vegetable plants require considerably lower dosage rates of insecticides and fungicides than do older plants. For weed and insect control, vegetables grown on sandy soils generally require lower application rates than the same vegetables grown on organic soils.

Weather plays an important role in the use of fungicides as low moisture years generally require lower rates and fewer applications than high moisture years. Some varieties of vegetables have greater resistance to specific diseases and are less attractive to insects than other varieties, requiring lower rates and fewer applications. Also, resistance of pests to pesticides plays an important role in determining rates and number of applications. Rates are generally lower when two or more pesticides with the same spectrum of control are applied in tank-mix applications than when those respective pesticides are applied as single ingredients.

RESULTS

In 1979, Southeast growers planted nearly 170,000 acres of cabbage, cantaloups, cucumbers, snap beans, sweet corn, tomatoes, and watermelons (Table 2). About 25 percent, or 45,000 acres, of these crops were planted for the processing market. Cucumbers and watermelons accounted for about 65 percent of the 170,000 total acres. Fresh market crops harvested during the summer season accounted

Table 2. Vegetables: Acres planted, fresh and processing markets, Southeast, 1979 a/

Crop and State	:	:	Fresh market			:
	:Processing:	:	:	:	:	
	:market	:	Spring	Summer	Fall	Total
----- 1,000 acres -----						
<u>Cabbage</u>						
North Carolina	-		2.5	3.0	2.3	7.8
South Carolina	-		.9	-	-	.9
Georgia	-		2.1	1.4	-	3.5
Region	-		5.5	4.4	2.3	12.2
<u>Cantaloups</u>						
South Carolina	-		-	2.9	-	2.9
Georgia	-		-	5.0	-	5.0
Region	-		-	7.9	-	7.9
<u>Cucumbers</u>						
North Carolina	29.1		3.9	5.5	-	38.5
South Carolina	11.1		4.0	-	1.1	16.2
Region	40.2		7.9	5.5	1.1	54.7
<u>Snap beans</u>						
North Carolina	4.2		2.9	3.8	.6	11.5
South Carolina	-		2.2	-	1.1	3.3
Georgia	1.0		3.2	1.4	1.9	7.5
Region <u>b/</u>	5.2		8.3	5.2	3.6	22.3
<u>Sweet corn</u>						
North Carolina	-		-	5.1	-	5.1
Region	-		-	5.1	-	5.1
<u>Tomatoes</u>						
North Carolina	-		-	1.8	-	1.8
South Carolina	-		6.1	2.3	-	8.4
Georgia	-		-	2.7	-	2.7
Region	-		6.1	6.8	-	12.9
<u>Watermelons</u>						
North Carolina	-		-	8.4	-	8.4
South Carolina	-		-	15.5	-	15.5
Georgia	-		11.5	18.9	-	30.4
Region	-		11.5	42.8	-	54.3
7 Crops <u>b/</u>	45.4		39.3	77.7	7.0	169.4

- = None reported in survey sample.

a/ "Vegetables, 1980 Annual Summary," U.S. Dept. Agr., Vg 1-2(80), December 1980.

b/ Pesticide usage data were not obtained for snap bean acreage in South Carolina and Georgia by the 1979 Vegetable Pesticide Survey.

for about 80,000 acres, or nearly one-half of the total acreage.

The growers used approximately 378,000 acre-treatments for the seven crops, with North Carolina and South Carolina each accounting for about 45 percent of the total (Table 3). Insecticides applied in single ingredient applications accounted for about 42 percent of the total 378,000 acre-treatments. Fungicides accounted for about 35 percent of the total. Tomatoes and cabbage each comprised 30 to 35 percent of the insecticide acre-treatments; tomatoes and watermelons 35 to 45 percent of the fungicide acre-treatments. Tank-mix applications applied to the seven crops accounted for about 44,000 acre-treatments, or 12 percent of the total.

The growers applied nearly 1 million pounds of active ingredients (a.i.) of all pesticides to the seven vegetable crops (Table 4). Nematicides used on tomatoes grown in South Carolina accounted for 60 percent of the total quantity applied to the seven crops in single ingredient and tank-mix applications. Relative to most other pesticides, nematicides are applied at high rates. For example, D-D was used at an average band application rate of 46 pounds per acre on nearly 4,000 acres of tomatoes by South Carolina growers. Use of D-D on tomatoes was not reported by North Carolina and Georgia growers.

Of the total quantity of pesticides applied to the seven crops, tank-mix applications containing two or more active ingredients accounted for about 280,000 pounds (a.i.) or about 30 percent of the total. Tomatoes accounted for nearly 90 percent of total active ingredients applied as tank-mixes.

PESTICIDE USE BY CROP

In the following sections, the major uses of pesticides by crop are discussed along with the primary pests controlled by these pesticides. Patterns of pesticide uses discussed include acres treated, acre-treatments, times

Table 3. Vegetables: Acre-treatments of pesticides by crop, single ingredient and tank-mix applications, Southeast, 1979 a/

Pesticide	: Cab-	: Canta-	: Cucum-	: Snap	: Sweet	: Toma-	: Water-	:
applications	: bage	: louns	: bers	: beans	: corn	: toes	: melons	: Total

-----1,000 acre-treatments

By category:

Single applications

Herbicidas	5.1	1.2	11.1	4.5	5.3	4.8	7.0	39.0
Insecticidas	54.2	4.2	25.4	14.2	11.2	49.4	1.5	160.1
Fungicidas	4.9	7.5	11.1	-	-	47.3	58.9	129.7
Nematicidas	-	-	-	-	-	4.8	b/	4.8

Tank-mix

<u>applications</u>	3.4	-	8.0	-	4.9	26.4	1.2	43.9
Total	67.6	12.9	55.6	18.7	21.4	132.7	68.6	377.5

By State:

North Carolina	58.6	<u>c/</u>	38.7	18.7	21.4	26.5	6.3	170.2
South Carolina	2.6	2.5	16.9	<u>d/</u>	<u>c/</u>	99.1	42.0	163.1
Georgia	6.4	10.4	<u>c/</u>	<u>d/</u>	<u>c/</u>	7.2	20.3	44.3
Total e/	67.6	12.9	55.6	18.7	21.4	132.8	68.6	377.6

- = none reported in the survey.

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ Less than 50 acre-treatments.

c/ This crop was not reported grown commercially in the State (Table 2).

d/ Crop was reported grown in the State but not included in the pesticide survey (Table 2).

e/ Minor differences in the totals by category and by State are due to rounding.

Table 4. Vegetables: Quantities of pesticides used by crop, single ingredient and tank-mix applications, Southeast, 1979. a/

Pesticide applications	: Cab- : bage	: Canta- : lous	: Cucum- : bers	: Snap : beans	: Sweet : corn	: Toma- : toes	: Water- : melons	: Total
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-----1,000 pounds a.i.-----

By category:

Single applications

Herbicides	5.6	1.3	17.9	2.6	6.7	4.9	6.1	45.1
Insecticides	42.4	2.1	22.0	9.5	12.1	42.8	1.2	132.1
Fungicides	4.7	9.6	21.8	-	-	80.9	73.3	190.3
Nematicides	-	-	-	-	-	315.2	<u>b/</u>	315.2

Tank-mix applications

	1.0	.5	10.8	-	2.2	266.2	2.1	282.8
Total	53.7	13.5	72.5	12.1	21.0	710.0	82.7	965.5

By State:

North Carolina	46.5	<u>c/</u>	46.9	12.1	21.0	37.0	10.0	173.5
South Carolina	1.7	2.5	25.6	<u>d/</u>	<u>c/</u>	665.7	47.1	742.6
Georgia	5.5	11.0	<u>c/</u>	<u>d/</u>	<u>c/</u>	7.3	25.6	49.4
Total	53.7	13.5	72.5	12.1	21.0	710.0	82.7	965.5

- = none reported in the survey.

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ Less than 50 pounds (a.i.).

c/ This crop was not reported grown commercially in the State (Table 2).

d/ Crop was reported grown in the State but not included in the pesticide survey (Table 2).

applied, rate per application, and annual rates by specific ingredient applied singly and in tank-mixes.

Cabbage

In 1979, Southeast growers planted approximately 12,200 acres of cabbage for the fresh market (Table 2). North Carolina growers planted 7,800 acres or 65 percent of the total crop acreage during the spring, summer, and fall seasons. Southeast cabbage growers used nearly 54,000 pounds (a.i.) of all pesticides in nearly 68,000 acre-treatments; North Carolina growers accounted for about 90 percent of the total acre-treatments and nearly 70 percent of the quantity used (Tables 5, 6, and 7).

Weeds affecting cabbage include annual grasses and broadleaf weeds such as barnyardgrass, signalgrass, crabgrass, foxtail, carpetweed, purslane, lambsquarters, and pigweed. Trifluralin was the major herbicide used accounting for about 60 to 100 percent of the total herbicide acre-treatments in each of the three States. Other herbicides included CDEC, DCPA, and nitrofen.

Major insect problems on cabbage in the Southeast are the leaf-feeding caterpillars: imported cabbageworm, diamondback caterpillar, and cabbage looper. In addition to these, North Carolina has major problems with cross-striped cabbageworm, cabbage maggot, green peach aphid, and cabbage aphid. In South Carolina, European corn borers also affect cabbage production. Methomyl accounted for about 45 percent of the total acre-treatments in North Carolina and South Carolina, and 80 percent of the total in Georgia. Other major insecticides included Bacillus thuringiensis, carbaryl, and methamidophos. In each of the three States, Bacillus thuringiensis was reported used in tank-mixes with other pesticides.

In the Southeast, major cabbage diseases include downy mildew and Alternaria leaf spot. Maneb and chlorothalonil accounted for about 60 and 35

Table 5. Cabbage: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, North Carolina, 1979 a/ b/

	:	:	:	:Pounds (a.i.) per acre:			
	: Acres	: Acre-	: Times	: Per time	: Annual	: Total	
Pesticides	: treated	:treatments:	: applied	: applied	: average	: pound	
	: c/	:	:	:	:	: (a.i.	
<hr/>							
<u>Herbicides</u>							
CDEC	188	180	1.0	1.5	1.5	282	
DCPA	367	367	1.0	6.2	6.2	2,282	
Nitrofen	247	247	1.0	1.9	1.9	470	
Trifluralin	3,559	3,793	1.1	.5	.5	1,901	
Other	-	82	-	3.2	-	259	
Total	-	4,669	-	1.1	-	5,201	
 <u>Insecticides</u>							
Azinphosmethyl	313	626	2.0	.5	1.0	310	
<u>Bacillus</u>							
<u>thuringiensis</u> d/	2,718	8,024	3.0	-	-	-	
Carbaryl	2,245	8,717	3.9	1.1	4.1	9,274	
Methamidophos	2,323	5,305	2.3	1.0	2.6	5,418	
Methomyl	4,281	21,458	5.0	.9	4.5	19,311	
Parathion	1,611	3,222	2.0	.2	.5	781	
Phosphamidon	879	879	1.0	1.0	1.0	879	
Other	-	496	-	.9	-	431	
Total	-	48,727	-	.7	-	36,411	
 <u>Fungicides</u>							
Chlorothalonil	344	1,408	4.1	.7	2.8	974	
Maneb	1,223	2,647	2.2	1.1	2.4	2,961	
Other	-	221	-	.9	-	191	
Total	-	4,276	-	1.0	-	4,134	
 <u>Tank-mixes</u>							
<u>Bacillus</u>							
<u>thuringiensis</u>				-	-	-	
+ insecticides d/	1,225	557	2.2	.3	.1	171	
Methomyl				.4	.9	101	
+ maneb	116	269	2.3	1.2	2.8	321	
Other	-	97	-	1.1	-	111	
Total	-	923	-	.8	-	711	
TOTAL PESTICIDES	-	58,595	-	.8	-	46,461	

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, US

b/ In 1979, 7,800 acres planted for fresh market only: Spring - 2,500 acres, Summer - 3,000 acres, and Fall - 2,300 acres (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds of active ingredients

Table 6. Cabbage: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, South Carolina, 1979 a/ b/

Pesticides	:	:	:	:Pounds (a.i.) per acre:		
	: Acres	: Acre-	: Times	: Per time	: Annual	:Totals
	: treated	:treatments:	: applied	: applied	: average	:pounds
	: c/	:	:	:	:	:(a.i.)
<u>Herbicides</u>						
Nitrofen	105	105	1.0	2.0	2.0	210
Trifluralin	199	199	1.0	.7	.7	135
Other	-	31	-	2.2	-	67
Total	-	335	-	1.2	-	416
<u>Insecticides</u>						
<u>Bacillus</u>						
<u>thuringiensis</u> <u>d/</u>	112	334	3.0	-	-	-
Endosulfan	77	342	4.4	.9	3.8	291
Methomyl	157	750	4.8	.3	1.6	243
Other	-	206	-	1.5	-	300
Total	-	1,632	-	.5	-	834
<u>Fungicides</u>						
Chlorothalonil	77	154	2.0	1.5	3.0	231
Mancozeb	70	140	2.0	.8	1.6	112
Other	-	22	-	.9	-	20
Total	-	316	-	1.1	-	363
<u>Tank-mixes</u>						
<u>Bacillus thuringiensis</u>						
<u>+ dimethoate</u> <u>d/</u>	35	350	1.0	.3	2.8	98
TOTAL PESTICIDES	-	2,633	-	.6	-	1,711

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 900 acres planted for the Spring fresh market (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds of active ingredients.

Table 7. Cabbage: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, Georgia, 1979 a/ b/

Pesticides	:	:	:	:Pounds (a.i.) per acre:		
	: Acres	: Acre-	: Times	: Per time	: Annual	:Totals
	: treated	:treatments:	: applied	: applied	: average	:pounds
	: c/	:	:	:	:	:(a.i.)
<u>Herbicides</u>						
Trifluralin	31	31	1.0	0.6	0.6	20
<u>Insecticides</u>						
Methomyl	628	3,082	4.9	1.5	7.4	4,678
Phosdrin	122	245	2.0	.5	1.0	122
Other	-	527	-	.6	-	297
Total	-	3,854	-	1.3	-	5,097
<u>Fungicides</u>						
Chlorothalonil	96	303	3.1	.7	2.3	223
Other	-	12	-	1.2	-	14
Total	-	315	-	.8	-	237
<u>Tank-mixes</u>						
<u>Bacillus</u>						
<u>thuringiensis</u>				-	-	-
+ oils	312	2,162	6.9	.1	.5	146
TOTAL PESTICIDES	-	6,362	-	.9	-	5,500

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 3,500 acres planted for fresh market only: Spring - 2,100 acres and Summer - 1,400 acres (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds of active ingredients.

percent, respectively, of the 4,300 acre-treatments used by North Carolina cabbage growers for controlling these diseases. In South Carolina, mancozeb and chlorothalonil were the major fungicides used, each accounting for about 45 to 50 percent of both the acre-treatments and the pounds (a.i.) applied. In Georgia, growers indicated chlorothalonil alone accounted for about 95 percent of the total acre-treatments and pounds (a.i.) applied.

Cantaloups

South Carolina cantaloup growers planted 2,900 acres, and Georgia growers harvested 5,000 acres during the 1979 summer season (Table 2). In Georgia, about 11,000 pounds (a.i.) of pesticides were used for approximately 10,000 acre-treatments compared with nearly 2,500 pounds (a.i.) and 2,500 acre-treatments in South Carolina (Tables 8 and 9).

The major weed problems include crabgrass, fall panicum, foxtails, goosegrass, and barnyardgrass. Bensulide was a primary herbicide used in South Carolina accounting for about 40 percent of the 135 herbicide acre-treatments. Cantaloup growers in Georgia used approximately 1,000 acre-treatments of all herbicides.

Pickleworms and cucumber beetles are the major insects affecting cantaloup production. Carbaryl accounted for about 65 percent of the insecticides used in South Carolina whereas methomyl was the primary insecticide in Georgia, accounting for about 90 percent of the total insecticides used there. The reason is that methomyl is somewhat more effective than carbaryl for controlling pickleworms, which are a greater pest problem for Georgia growers. Pickleworms overwinter in Florida and move northward during the growing season.

Diseases affecting cantaloups include downy mildew, anthracnose, *Alternaria* leaf spot, gummy stem blight, and powdery mildew. Chlorothalonil was one of the primary fungicides used, accounting for about 50 percent of the

Table 8. Cantaloups: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, South Carolina, 1979 a/ b/

	:	:	:	:Pounds (a.i.) per acre:			
	: Acres	: Acre-	: Times	: Per time	: Annual	:Totals	
Pesticides	: treated	:treatments:	: applied	: applied	: average	:pounds	
	: c/	:	:	:	:	:(a.i.)	
<u>Herbicides</u>							
Bensulide	49	49	1.0	3.4	3.4	167	
Other	-	96	-	1.1	-	109	
Total	-	135	-	2.1	-	276	
<u>Insecticides</u>							
Carbaryl	226	259	1.1	.7	.8	189	
Parathion	20	20	1.0	.2	.2	3	
Other	-	114	-	1.0	-	109	
Total	-	393	-	.8	-	301	
<u>Fungicides</u>							
Chlorothalonil	259	1,015	3.9	.9	3.7	952	
Folpet	280	460	1.6	.3	.4	115	
Maneb	143	193	1.3	3.0	4.0	575	
Other	-	288	-	.8	-	228	
Total	-	1,956	-	1.0	-	1,870	
TOTAL PESTICIDES	-	2,484	-	1.0	-	2,447	

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 2,900 acres planted for the Summer fresh market (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

Table 9. Cantaloups: Pesticide usage patterns and quantities applied, rates and quantity used, single ingredient and tank-mix applications, Georgia, 1979 a/ b/

Pesticides	:	:	:	:Pounds (a.i.) per acre:		
	: Acres	: Acre-	: Times	: Per time	: Annual	:Totals
	: treated	:treatments:	: applied	: applied	: average	:pounds
	: c/	:	:	:	:	:(a.i.)
<u>Herbicides</u>						
Benefin	134	134	1.0	0.6	-	85
Other	-	892	-	1.1	-	988
Total	-	1,026	-	1.0	-	1,073
<u>Insecticides</u>						
Methomyl	967	3,484	3.6	.4	1.6	1,556
Other	-	313	-	.7	-	218
Total	-	3,797	-	.5	-	1,774
<u>Fungicides</u>						
Chlorothalonil	1,455	5,053	3.5	1.5	5.1	7,357
Other	-	400	-	.9	-	352
Total	-	5,433	-	1.4	-	7,709
<u>Tank-mixes</u>						
Benomyl						
+ chlorothalonil	103	103	1.0	1.1	1.1	117
Other	-	41	-	4.7	-	191
Total	-	144	-	3.2	-	462
TOTAL PESTICIDES	-	10,400	-	1.1	-	11,018

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 5,000 acres planted for the Summer fresh market (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

acre-treatments used as single applications in South Carolina and about 95 percent of the acre-treatments in Georgia.

Cucumbers

The processing market accounts for nearly 75 percent of the cucumber acreage planted in North Carolina and South Carolina (Table 2). Cucumbers are not grown for the commercial market in Georgia. Fresh market cucumbers are planted for harvest during the spring and fall seasons in South Carolina and during the spring and summer seasons in North Carolina. In 1979, there were approximately 56,000 acre-treatments of all pesticides in the two States (Tables 10 and 11). North Carolina growers accounted for 70 percent of the planted acreage and nearly 70 percent of the total acre-treatments.

Bensulide and naptalam were the major herbicides used for controlling crabgrass, fall panicum, foxtail, goosegrass, and barnyardgrass. Bensulide accounted for about 55 percent of the herbicide acre-treatments in each State. Naptalam accounted for nearly 40 percent of the herbicide acre-treatments in North Carolina and less than 10 percent of the acre-treatments in South Carolina.

Major insects affecting cucumbers in the two States include pickleworms and cucumber beetles. Carbaryl accounted for nearly 90 percent of the acre-treatments of insecticides used on cucumbers in North Carolina and lindane accounted for about 80 percent of the acre-treatments in South Carolina. A possible reason for the difference is that in the 1979 Cooperative University Extension Spray Guides the North Carolina crop specialists recommended only carbaryl for controlling pickleworms, whereas South Carolina crop specialists recommended both lindane and carbaryl for controlling these insects. Methomyl accounted for most of the remaining acre-treatments in both States; about 10 to 15 percent.

The disease problems affecting cucumbers include downy mildew, anthracnose,

Table 10. Cucumbers: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, North Carolina, 1979 a/ b/

	:	:	:	:Pounds (a.i.) per acre:			
Pesticides	:	Acres	Acres-	Times	Per time	Annual	Totals
	:	treated	treatments:	applied	applied	average	pounds
	:	c/	:	:	:	:	(a.i.)
<u>Herbicides</u>							
Bensulide	5,074	5,074	1.0	1.5	1.5	7,550	
Naptalam	3,466	3,466	1.0	1.9	1.9	6,547	
Other	-	699	-	1.0	-	690	
Total	-	9,239	-	1.6	-	14,787	
<u>Insecticides</u>							
Carbaryl	5,213	19,223	3.7	.9	3.5	18,072	
Methomyl	1,008	2,016	2.0	.9	1.8	1,814	
Other	-	247	-	1.5	-	371	
Total	-	21,486	-	1.0	-	20,257	
<u>Fungicides</u>							
Chlorothalonil	2,425	4,850	2.0	1.6	3.2	7,835	
Maneb	435	1,118	2.6	1.3	3.4	1,491	
Other	-	24	-	.3	-	7	
Total	-	5,992	-	1.6	-	9,333	
<u>Tank-mixes</u>							
Naptalam							
+ other herbicides	168	168	1.0	1.9	1.9	324	
Disulfoton							
+ nematicides	1,759	1,759	1.0	1.0	1.0	1,705	
Other	-	42	-	2.3	-	98	
Total	-	1,969	-	1.3	-	2,486	
TOTAL PESTICIDES	-	38,686	-	1.2	-	46,863	

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 38,500 acres planted: 29,100 acres for the processing market and for the fresh market: Spring - 3,900 acres and Summer - 5,500 acres (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

Table 11. Cucumbers: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, South Carolina, 1979 a/ b/

Pesticides	:	:	:	:Pounds (a.i.) per acre:		
	: Acres	: Acre-	: Times	: Per time	: Annual	: Totals
	: treated	: treatments:	: applied	: applied	: average	: pounds
	: c/	:	:	:	:	: (a.i.)
<u>Herbicides</u>						
Bensulide	577	977	1.7	2.6	4.3	2,490
Naptalam	100	100	1.0	3.2	3.2	320
Other	-	734	-	.4	-	324
Total	-	1,811	-	1.7	-	3,134
<u>Insecticides</u>						
Lindane	861	3,326	.4	.3	1.1	935
Methomyl	203	609	3.0	1.1	3.2	652
Other	-	126	-	.7	-	87
Total	-	4,061	-	.4	-	1,674
<u>Fungicides</u>						
Difolatan	668	1,200	1.8	1.7	3.1	2,071
Maneb	863	3,253	3.8	1.5	5.6	4,792
Other	-	322	-	.7	-	231
Total	-	4,775	-	1.5	-	7,094
<u>Nematicides</u>						
D-D	300	300	1.0	18.0	18.0	5,400
<u>Tank-mixes</u>						
Naptalam + bensulide	345	345	1.0	1.7 3.4	1.7 3.4	587 1,170
Benomyl + methomyl	423	4,046	9.6	.5 .5	4.8 4.4	2,016 1,862
Lindane + maneb	1,250	1,250	5.0	1.2 .3	1.2 .3	1,500 352
Other	-	343	-	2.4	-	837
Total	-	5,984	-	1.4	-	8,324
TOTAL PESTICIDES	-	16,931	-	1.5	-	25,626

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 16,200 acres planted: 11,100 acres for the processing market and for the fresh market: Spring - 4,000 acres and Fall 1,100 acres (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

gummy stem blight, and belly rot. Chlorothalonil, maneb, and difolatan were the major fungicides used in both States. Maneb and chlorothalonil accounted for nearly all of the acre-treatments in North Carolina, and maneb and difolatan about 90 percent of the acre-treatments in South Carolina. In South Carolina, benomyl and maneb were each used in tank-mixes with insecticides on about 5,300 acres.

Snap beans

In 1979, approximately 22,300 acres of snap beans were planted in North Carolina, South Carolina, and Georgia (Table 2). However, only snap bean growers in North Carolina were surveyed in the 1979 Vegetable Pesticide Survey. The North Carolina growers accounted for 11,500 acres of the snap bean acreage in the Southeast, or about 50 percent. About 60 percent of the North Carolina crop was planted for the fresh market. For the processing and fresh market crops, about 12,000 pounds (a.i.) were used in approximately 19,000 acre-treatments (Table 12).

Trifluralin was the major herbicide used accounting for about 70 percent of the acre-treatments and 60 percent of the active ingredients applied. Some of the weeds controlled by trifluralin include barnyardgrass, signalgrass, crabgrass, foxtail, goosegrass, lambsquarters, and pigweed.

Major insects affecting North Carolina snap beans include Mexican bean beetle, bean leaf beetle, and thrips. Dimethoate and carbaryl were the major insecticides used, accounting for about 80 percent of the acre-treatments and quantity of active ingredients applied.

The surveyed growers did not report fungicide use on snap beans in 1979.

Sweet corn

An estimated 5,100 acres of sweet corn were harvested in North Carolina

Table 12. Snap beans: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, North Carolina, 1979 a/ b/

	:	:	:	:Pounds (a.i.) per acre:			
	:	Acres	Acres-	Times	Per time	Annual	Totals
Pesticides	:	treated	treatments:	applied	applied	average	pounds
	:	c/	:	:	:	:	(a.i.)
<hr/>							
<u>Herbicides</u>							
Trifluralin	3,282	3,282	1.0	0.5	0.5	1,641	
Other	-	1,260	-	.8	-	1,002	
Total	-	4,542	-	.6	-	2,643	
 <u>Insecticides</u>							
Carbaryl	1,205	5,107	4.2	.9	3.8	4,596	
Dimethoate	3,347	6,287	1.9	.5	1.0	3,170	
Phosdrin	1,837	2,427	1.3	.5	.7	1,321	
Other	-	310	-	1.3	-	392	
Total	-	14,131	-	.7	-	9,479	
TOTAL PESTICIDES	-	18,673	-	.6	-	12,122	

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 11,500 acres planted: 4,200 acres for the processing market and for the fresh market: Spring - 2,900 acres, Summer - 3,800 acres, and Fall - 600 acres (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

for the fresh market during the 1979 summer season (Table 2). Sweet corn was not grown for the commercial market in South Carolina and Georgia. For the North Carolina crop, about 21,000 pounds (a.i.) of all pesticides were used in approximately 21,000 acre-treatments (Table 13).

Atrazine, butylate⁺, and alachlor were the major herbicides reported accounting for about 50 percent of acre-treatments and 85 percent of the pounds (a.i.) used as single applications.

The major insects affecting sweet corn in North Carolina include corn earworm, European corn borer, Fall armyworm, and sap beetle. Methomyl accounted for about 75 percent of the insecticide acre-treatments and carbaryl most of the remainder.

No fungicide use was reported in North Carolina during 1979.

Tomatoes

In 1979, approximately 12,900 acres of tomatoes were planted for the fresh market in the Southeast (Table 2). South Carolina growers harvested 8,400 acres or 65 percent of the total during the spring and summer seasons. Growers in North Carolina and Georgia harvested the remaining 4,500 acres during the summer season only. For tomatoes grown in the three States, about 710,000 pounds (a.i.) were applied in about 133,000 acre-treatments (Tables 14, 15, and 16). South Carolina growers accounted for about 95 percent of the quantity used and 75 percent of the acre-treatments.

Trifluralin, napropamide, and metribuzin accounted for 98 percent of the acre-treatments in North Carolina and nearly 80 percent in South Carolina. In Georgia, pebulate and trifluralin comprised about 90 percent of the herbicide acre-treatments. A large number of annual grasses and broadleaf weeds affect tomatoes, including crabgrass, crowfootgrass, lambsquarters, pigweed, purslane, ragweed, and smartweed.

Table 13. Sweet corn: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, North Carolina, 1979 a/ b/

Pesticides	:	:	:	:Pounds (a.i.) per acre:			:
	: Acres	: Acre-	: Times	: Per time	: Annual	: Totals	
	: treated	: treatments:	: applied	: applied	: average	: pounds	
	: c/	:	:	:	:	: (a.i.)	
<u>Herbicides</u>							
Alachlor	545	545	1.0	2.2	2.2	1,218	
Atrazine	1,292	1,292	1.0	2.5	2.5	3,247	
Butylate	731	731	1.0	1.7	1.7	1,254	
2,4-D	377	377	1.0	.5	.5	188	
Other	-	2,331	-	.3	-	782	
Total	-	5,276	-	1.3	-	6,689	
<u>Insecticides</u>							
Carbaryl	738	2,609	3.5	1.7	5.9	4,383	
Methomyl	1,670	8,567	5.1	.9	4.6	7,710	
Other	-	48	-	1.0	-	50	
Total	-	11,224	-	1.1	-	12,143	
<u>Tank-mixes</u>							
Atrazine				1.3	1.9	146	
+ herbicides	75	111	1.5	.8	1.2	87	
Methomyl				.2	2.4	754	
+ methyl parathion	319	4,788	15.0	.3	3.8	1,197	
Total	-	4,899	-	.4	-	2,184	
TOTAL PESTICIDES	-	21,399	-	1.0	-	21,016	

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 5,100 acres planted for the Summer fresh market (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

Table 14. Tomatoes: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, North Carolina, 1979 a/ b/

	: Acres	: Acre-	: Times	:Pounds (a.i.) per acre:		
Pesticides	: treated	: treatments	: applied	: Per time	: Annual	: Totals
	: c/	:	:	: applied	: average	: pounds
						: (a.i.)
<u>Herbicides</u>						
Metribuzin	120	240	2.0	0.7	1.4	168
Napropamide	677	677	1.0	.6	.6	398
Trifluralin	144	1,474	10.2	1.0	10.2	1,474
Other	-	51	-	4.0	-	203
Total	-	2,442	-	.9	-	2,243
<u>Insecticides</u>						
Carbaryl	1,181	8,821	7.5	.7	5.3	6,218
Methomyl	207	977	4.7	.3	1.3	259
Malathion	165	1,063	6.4	1.2	7.9	1,297
Other	-	1,153	-	.6	-	657
Total	-	12,014	-	.7	-	8,431
<u>Fungicides</u>						
Chlorothalonil	876	8,352	9.5	.9	8.7	7,578
Maneb	240	1,665	6.9	1.0	7.0	1,687
Other	-	868	-	.8	-	709
Total	-	10,885	-	.9	-	9,974
<u>Nematacides</u>						
Chloropicrin						
+ methyl bromide	112	112	1.0	88.8	88.8	9,942
<u>Tank mixtures</u>						
Carbaryl						1,125
+ fungicides	-	554	-	-	-	1,064
Maneb						904
+ fungicides						1,657
+ insecticides	-	462	-	-	-	28
Other	-	11	-	-	-	5
Total	-	1,027	-	-	-	4,783
TOTAL PESTICIDES	-	26,480	-	-	-	37,024

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,800 acres planted for the Summer fresh market (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

Table 15. Tomatoes: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, South Carolina, 1979 a/ b/

Pesticides	:	:	:	:Pounds (a.i.) per acre:		
	: Acres	: Acre-	: Times	: Per time	: Annual	: Totals
	: treated	: treatments	: applied	: applied	: average	: pounds
	: c/	:	:	:	:	: (a.i.)
<u>Herbicides</u>						
Metribuzin	856	856	1.0	1.1	1.1	943
Napropamide	210	210	1.0	.7	.7	137
Trifluralin	464	464	1.0	2.1	2.1	956
Other	-	457	-	.7	-	459
Total	-	1,987	-	1.3	-	2,495
<u>Insecticides</u>						
<u>Bacillus</u>						
<u>thuringiensis d/</u>	1,214	4,176	3.4	-	-	-
Carbaryl	2,159	8,160	3.8	2.0	7.6	16,320
Endosulfan	1,135	6,056	5.3	.4	2.4	2,682
Methomyl	2,209	5,459	2.5	.9	2.2	4,900
Toxaphene	1,247	3,084	2.5	1.2	3.0	3,719
Other	-	5,553	-	.4	-	2,359
Total	-	32,488	-	.9	-	29,980
<u>Fungicides</u>						
Copper hydroxide	2,941	7,993	2.7	1.1	3.1	9,127
Maneb	3,204	23,977	7.5	2.0	15.0	47,954
Other	-	2,602	-	4.4	-	11,540
Total	-	34,572	-	2.0	-	68,621
<u>Nematicides</u>						
D-D	3,975	3,975	1.0	46.0	46.0	182,925
Other	-	681	-	176.7 <u>e/</u>	-	120,340
Total	-	4,656	-	65.1	-	303,265
<u>Tank-mixes</u>						
<u>Bacillus</u>						
<u>thuringiensis</u>				-		-
+ insecticides				.5		5,356
+ fungicides <u>d/</u>	1,911	11,509	6.0	1.3	-	15,031
Carbaryl				.5		2,413
+ insecticides				.8		3,948
+ fungicides	420	4,753	11.3	3.0	-	14,213
Other	-	9,145	-	13.2	-	220,366
Total	-	25,407	-	10.3	-	261,327
TOTAL PESTICIDES	-	99,110	-	6.7	-	665,688

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 8,400 acres planted: for the fresh market only: Spring - 6,100 acres and Fall - 2,300 acres (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds of active ingredients.

e/ Consists of methyl bromide and other nematicides having high application rates.

Table 16. Tomatoes: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, Georgia, 1979 a/ b/

	: Acres	: Acre-	: Times	:Pounds (a.i.) per acre:		
Pesticides	: treated	: treatments:	: applied	: Per time	: Annual	: Totals
	: c/	:	:	: applied	: average	: pounds
				:	:	: (a.i.)
<u>Herbicides</u>						
Diphenamid	32	32	1.0	2.3	2.3	76
Pebulate	204	204	1.0	.2	.2	41
Trifluralin	196	196	1.0	.2	.2	48
Other	-	3	-	4.0	-	12
Total	-	435	-	.4	-	177
<u>Insecticides</u>						
Carbaryl	214	791	3.7	1.4	5.0	1,079
Methomyl	412	2,592	6.3	.5	2.9	1,207
Malathion	119	186	1.6	1.0	1.6	193
Toxaphene	210	1,237	5.9	1.5	8.8	1,855
Other	-	129	-	.6	-	82
Total	-	4,935	-	.9	-	4,416
<u>Fungicides</u>						
Chlorothalonil	267	1,270	4.8	1.4	6.5	1,730
Maneb	108	516	4.8	1.1	5.4	588
Other	-	27	-	1.3	-	35
Total	-	1,813	-	1.3	-	2,353
<u>Nematicides</u>						
Ethylene dibromide	24	24	1.0	14.8	14.7	355
<u>Tank mixtures</u>						
Disulfoton				1.1	1.1	16
+ ethoprop	15	15	1.0	2.1	2.1	31
TOTAL PESTICIDES	-	7,222	-	1.0	-	7,348

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 2,700 acres planted for the Summer fresh market (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

Major insects affecting tomatoes include tomato fruitworm, hornworm, Colorado potato beetle, flea beetle, and stink bugs. Carbaryl and methomyl were used in all three States, together accounting for about 80 percent of the total insecticides applied as single applications in North Carolina, 40 percent in South Carolina, and 70 percent in Georgia. Other major insecticides included malathion, Bacillus thuringiensis, toxaphene, and endosulfan. In South Carolina, Bacillus thuringiensis was used in tank-mixes with fungicides and other insecticides for about 12,000 acre-treatments.

Major diseases affecting tomatoes in the Southeast include Alternaria leaf spot, early blight, late blight, gray leaf spot, Botrytis gray mold, leaf mold, gray stenphylium leaf, septoria leaf spot, and bacterial spot. Chlorothalonil accounted for nearly 80 percent of the acre-treatments of fungicides in North Carolina and 70 percent in Georgia with single applications. Copper hydroxide was important in South Carolina accounting for about 70 percent of the acre-treatments, followed by maneb with nearly 25 percent.

Root-knot is the major nematode problem in the Southeast. D-D comprised 85 percent of the 4,700 acre-treatments in South Carolina. Chloropicrin + methyl bromide was used on about 100 acres in North Carolina, and ethylene dibromide on about 25 acres in Georgia.

Watermelons

In 1979, approximately 54,000 acres of watermelons were planted in the Southeast (Table 2). About 30,000 acres of watermelons were planted in Georgia for harvest during the spring and summer seasons, the remaining acreage in North Carolina and South Carolina was for harvest during the summer season only. For the three States, an estimated 83,000 pounds (a.i.) were used in 69,000 acre-treatments (Tables 17, 18, and 19).

Bensulide, butralin, and naptalam accounted for about 90 percent of the

Table 17. Watermelons: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, North Carolina, 1979 a/ b/

Pesticides	:	:	:	:Pounds (a.i.) per acre:		
	: Acres	: Acre-	: Times	: Per time	: Annual	: Totals
	: treated	: treatments	: applied	: applied	: average	: pounds
	: c/	:	:	:	:	: (a.i.)
<u>Herbicides</u>						
Bensulide	502	502	1.0	0.4	0.4	198
Butralin	765	765	1.0	2.0	2.0	1,531
Naptalam	198	198	1.0	1.9	1.9	371
Other	-	131	-	1.4	-	183
Total	-	1,596	-	1.4	-	2,283
<u>Insecticides</u>						
Carbaryl	29	51	1.8	1.5	2.6	75
Other	-	3	-	.3	-	1
Total	-	54	-	1.4	-	76
<u>Fungicides</u>						
Chlorothalonil	1,515	2,516	1.7	1.3	2.1	3,145
Difolatan	994	1,321	1.3	2.5	3.3	3,361
Other	-	56	-	2.1	-	118
Total	-	3,893	-	1.7	-	6,624
<u>Tank-mixes</u>						
Disulfoton				.5	.5	344
+ ethoprop	765	765	1.0	.9	.9	689
TOTAL PESTICIDES	-	6,308	-	1.6	-	10,016

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 8,400 acres planted for the Summer fresh market (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

Table 18. Watermelons: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, South Carolina, 1979 a/ b/

Pesticides	:	:	:	:Pounds (a.i.) per acre:		
	: Acres	: Acre-	: Times	: Per time	: Annual	: Totals
	: treated	: treatments:	: applied	: applied	: average	: pounds
	: c/	:	:	:	:	: (a.i.)
<u>Herbicides</u>						
Bensulide	19	19	1.0	4.0	4.0	77
Other	-	3,073	-	.4	-	1,296
Total	-	3,092	-	.4	-	1,373
<u>Insecticides</u>						
Carbaryl	300	390	1.3	1.2	1.5	456
Other	-	69	-	.8	-	53
Total	-	459	-	1.1	-	509
<u>Fungicides</u>						
Benomyl	1,636	4,187	2.6	2.0	5.1	8,405
Chlorothalonil	3,887	12,132	3.1	1.0	3.0	11,735
Difolatan	2,822	7,451	2.6	.9	2.4	6,712
Maneb	4,985	14,236	2.9	1.3	3.6	17,846
Other	-	466	-	1.1	-	509
Total	-	38,442	-	1.2	-	45,177
TOTAL PESTICIDES	-	42,023	-	1.1	-	47,089

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 15,500 acres planted for the Summer fresh market (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

Table 19. Watermelons: Pesticide usage patterns and quantities applied, single ingredient and tank-mix applications, Georgia, 1979 a/ b/

Pesticides	:	:	:	:Pounds (a.i.) per acre:		
	: Acres	: Acre-	: Times	: Per time	: Annual	: Total
	: treated	: treatments:	: applied	: applied	: average	: pounds
	: c/	:	:	:	:	: (a.i.)
<u>Herbicides</u>						
Bensulide	77	77	1.0	4.0	4.0	308
Other	-	2,237	-	1.0	-	2,153
Total	-	2,314	-	1.1	-	2,461
<u>Insecticides</u>						
Carbaryl	286	382	1.3	.8	.7	322
Methomyl	223	352	1.6	.4	.7	158
Other	-	276	-	.5	-	144
Total	-	1,010	-	.6	-	624
<u>Fungicides</u>						
Benomyl	815	1,650	2.0	.5	.9	756
Chlorothalonil	4,808	14,015	2.9	1.4	4.1	19,531
Maneb	531	657	1.2	1.6	2.0	1,051
Other	-	172	-	.7	-	112
Total	-	16,494	-	1.3	-	21,450
<u>Tank-mixes</u>						
Alanap				1.6	1.6	96
+ bensulide	60	60	1.0	1.1	1.1	68
Carbaryl				1.0	2.0	245
+ chlorothalonil	122	245	2.0	.9	1.8	223
Other	-	155	-	2.7	-	422
Total	-	460	-	2.3	-	1,054
TOTAL APPLICATIONS	-	20,278	-	1.3	-	25,589

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 30,400 ares planted for fresh market only: Spring - 11,500 acres and Summer - 18,900 acres (Table 2).

c/ Data in this column for "other" and "total" not reported because two or more materials may have been used on the same acre resulting in double counting.

herbicides applied in North Carolina in 1979. Major weed problems included barnyardgrass, signalgrass, lambsquarters, pigweed, purslane, foxtails, goosegrass, and smartgrass. Herbicides were used for about 3,000 acre-treatments in South Carolina and 2,300 acres in Georgia.

Major insects affecting watermelons include cucumber beetle and cabbage looper. Carbaryl comprised from 85 to 95 percent of the acre-treatments of insecticides using single applications in North Carolina and South Carolina and about 40 percent in Georgia. Pounds (a.i.) per application ranged from 0.8 pound per acre in Georgia to 1.5 pounds per acre in North Carolina and South Carolina.

Diseases affecting watermelons include anthracnose, gummy stem blight, and downy mildew. According to crop specialists, in 1979 considerably higher rainfall occurred in the watermelon producing areas of South Carolina as compared with the other two States. As a result, South Carolina growers used an average of 2.5 fungicide treatments for disease control as compared to about 0.8 treatment used by North Carolina and Georgia growers.

Chlorothalonil and difolatan accounted for nearly all of the acre-treatments using fungicides in North Carolina and 85 percent in Georgia. Maneb was about equal in importance to chlorothalonil in South Carolina with each comprising about 35 percent of the acre-treatments using fungicides.

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